Stormwater - Technical Standards	
Date:	**September 19, 2008 (rev. 11/13/2008)**
Re:	**Stormwater, Manufactured Treatment Devices**

1. City ordinances require that new development and redevelopment incorporate permanent stormwater management controls that will capture 80% of the total suspended solids (TSS) that become entrained in stormwater flow across the property and would otherwise be discharged off site.

   For further context, see City Code, the Stormwater Design Guide and Controls Manual.

2. The purpose of this memorandum is to describe the method by which the City will evaluate the effectiveness of manufactured treatment devices ("vaults"), especially those available from commercial vendors.

3. Designers may choose to use manufactured treatment devices to achieve all or a portion of the 80% TSS removal requirement. These devices might be a public-domain or custom design by the site engineer, or a proprietary control available from a commercial vendor.

   One would expect the performance of these devices to be different, because of different design goals and because of intrinsically different levels of effectiveness.

Parameter/feature	Variability/range
Design goal	Gross solids v. sand v. fine silt v. other (e.g., oil, phosphorus)
Design type	On-line v. off-line
Effectiveness of system	E.g., 50% efficiency, 60%, 75%, 80%+
Method of testing/verifying the effectiveness	E.g., Lab tests, field tests, particle size distribution (PSD), sample parameters, sampling locations, timing, methods
Variety of storm events	Intensity, duration, volume of runoff
Other factors affecting pollutant loading	Antecedent rains, season of year and pollutant buildup, land use and activities
Maintenance	Inadequate v. adequate

   Thus, evaluating and verifying the performance of a given system is not straightforward, making the method of testing a key issue in verifying the performance level of a device (50%, 60%, etc.).

4. Section 2.2.25, "Proprietary Structural Controls," in Murfreesboro's Stormwater Controls Manual

   The City's Stormwater Controls Manual makes several statements with respect to selecting and verifying the performance of proprietary structural controls:

In order for use as a limited application control, a proprietary system must have a demonstrated capability of meeting the stormwater management goals for which it is being intended. This means that the system must provide:

1. Independent third-party scientific verification of the ability of the proprietary system to meet water quality treatment objectives and/or to provide water quantity control (streambank or flood control)
2. Proven record of longevity in the field
3. Proven ability to function in Rutherford County conditions (e.g., climate, rainfall patterns, soil types, etc.)
4. Maintainability - Documented procedures for required maintenance including collection and removal of pollutants or debris.

For a proprietary system to meet item 1. above for water quality goals, the following monitoring criteria should be met for supporting studies:

- At least 15 storm events must be sampled.
- The study must be independent or independently verified (i.e., may not be conducted by the vendor or designer without third-party verification).
- The study must be conducted in the field, as opposed to laboratory testing.
- Field monitoring must be conducted using standard protocols which require proportional sampling both upstream and downstream of the device.
- Concentrations reported in the study must be flow-weighted.
- The propriety system or device must have been in place for at least one year at the time of monitoring.

Although local data is preferred, data from other regions can be accepted as long as the design accounts for the local conditions.

Local governments may submit a proprietary system to further scrutiny based on the performance of similar practices. A poor performance record or high failure rate is valid justification for not allowing the use of a proprietary system or device. Consult your local review authority for more information in regards to the use of proprietary structural stormwater controls.

5. Because the above criteria are similar to those of the ETV and TARP (and possibly TAPE) technology verification programs, one may refer to those programs (see web links in References below) to identify the performance levels of given devices. See the criteria in #7 below.

6. Online vs. offline treatment systems

   An on-line treatment system, for the purpose of this memorandum, is one that allows stormwater flows greater than the design storm to pass through the system's treatment process. The Murfreesboro design storm is a 1.2 inch rainfall over a two-hour period. An off-line system routes the larger flows away from the treatment process. An internal by-pass can be used to achieve the off-line condition.

Where a treatment process – whether proprietary or not - is subject to flow rates greater than the design storm, the possibility of re-suspension of collected sediment is greater.

Unless a device has been evaluated under a standardized protocol for larger flows such as the one in ten year probabilities under standardized test protocols (e.g. NJCAT) and deemed acceptable, then the approvals for Murfreesboro are for off-line controls.

7. Interim criteria for evaluations by City of Murfreesboro

   (1) In general, test results meeting the published, standard protocols of third party technology verification programs (ETV, TARP, TAPE) and accepted by those programs will be recognized by the City. These protocols are similar or completely satisfy the criteria spelled out above.

   (2) Devices or systems fully meeting the TARP Tier II field test protocol (U. Mass. Status Rating 1) will be accepted at the rated efficiency, up to 80% TSS, under the general conditions specified in the performance evaluation, provided the mean particle size distribution by weight is 100 um or less.

   (3) Devices or systems meeting the NJDEP laboratory test protocol for either TSS or SSC, with a mean particle size distribution by weight at 100 um or smaller, will be accepted at the rated efficiency, up to 80%, provided the engineer's design and installation are off-line.

   (4) Other devices may submit test results for evaluation. These will be evaluated according to the language – see above – in the Stormwater Controls manual.

   (5) The list of devices established by Metro Nashville will be accepted for 50% TSS reduction, provided the engineer's design and installation of the device are off-line. (ftp://ftp.nashville.gov/web/stormwater/2006SWMM/WQUnits_2006.pdf).

References:

- Technology Acceptance Reciprocity Partnership (TARP) website http://www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp/
- New Jersey DEP http://www.state.nj.us/dep/dsr/bscit/CertifiedMain.htm
- University of Massachusetts Stormwater Technologies Clearinghouse http://www.mastep.net/ (must register via the web site to use the database)
- EPA's Environmental Technology Verification http://www.epa.gov/etv/vt-wqp.html#SWSATD
- City Code, Chapter 27 ½, Stormwater Management, Article I (http://www.murfreesborotn.gov/government/water_sewer/stormwater/ordinances.html)
- Murfreesboro Stormwater Design Guide
- Murfreesboro Stormwater Controls Manual

Revision record: Ver. 1b, 11/13/2008, corrected section on on-line and off-line systems

City of Murfreesboro
Proprietary Stormwater Treatment Controls
List of units approved at pretreatment level (50%)

The following table is taken from a list developed by Metro Nashville. Nashville is phasing out approval of these units in November, 2008. See the web link below for current information on the status of these devices under the Nashville stormwater program.

(Check http://www.nashville.gov/stormwater for current Selection Guide)

Table 1
Rate Based Proprietary Stormwater Quality Units

Stormwater units in Table 1 are accepted at pretreatment status (i.e. 50% TSS removal). After July 1, 2009, the City of Murfreesboro will not recognize the units at this treatment level unless testing meeting criteria of the Stormwater Controls Manual and the Technical Memorandum on Manufactured Treatment Devices is complete.

Manufactured Stormwater Quality Units	Stormwater Quality Unit Model Number	Maximum Treatment Flow Rate (cfs)
Vortech	1000	1.6
	2000	2.8
	3000	4.4
	4000	6.3
	5000	8.6
	7000	11.2
	9000	14.2
	11000	17.5
	16000	25.2
Vortsentry	VS30	0.46
	VS40	1.38
	VS50	2.43
	VS60	3.86
	VS70	6.53
	VS80	10
	VS100	14.53
	VS120	20.26

Stormceptor	STC450	0.283
	STC900	0.636
	STC1200	0.636
	STC1800	0.636
	STC2400	1.059
	STC3600	1.059
	STC4800	1.766
	STC6000	1.766
	STC7200	2.472
	STC11000	3.531
	STC13000	3.531
	STC16000	4.944
Suntree Baffle Box	4 X 8 X 84N	9
	6 X 12 X 84N	20
	8 X 16 X 96N	34
Crystal Stream	Model 646	3.54
	Model 956	7.38
	Model 1056	10.33
	Model 1266	14.16
	Model 1856	11.8
	Model 2056	14.75
	Model 2466	21.24
ADS Stormwater Unit	3620WQA	1.5
	3640WQA	3.2
	3620WQB	0.7
	3640WQB	1.6
	4220WQA	1.73
	4240WQA	3.66
	4220WQB	0.86
	4240WQB	1.83
	4820WQA	2.26
	4840WQA	4.78
	4820WQB	1.13
	4840WQB	2.39
	6020WQA	2.95
	6040WQA	6.23
	6020WQB	1.47
	6040WQB	3.12
Baysaver Technologies	1/2 k	1.1
	1 K	2.4
	3 K	7.2
	5 K	11
	10 K	21.8
Downstream Defender	4 - FT	3
	6 - FT	8
	8 - FT	15
	10 - FT	25

CDS Technologies	PMSU20_15_4	0.7
	PMSU20_15_5	0.7
	PMSU20_20_5	1.1
	PMSU20_25_6	1.6
	PMSU30_25_7	2.1
	PMSU30_30_8	2.8
	PMSU30_30_9	3.5
	PMSU40_30_10	4.4
	PMSU40_30_12	6.3
Aqua-Swirl	AS-2	1.1
	AS-3	1.8
	AS-4	3.2
	AS-5	4.4
	AS-6	6.3
	AS-7	8.6
	AS-8	11.2
	AS-9	14.2
	AS-10	17.5
	AS-12	25.2
Aqua-Filter	AF-3.1	1.8
	AF-4.2	3.2
	AF-5.3	4.4
	AF-6.5	6.3
	AF-7.6	8.6
	AF-8.8	11.2
	AF-9.10	14.2
	AF-10.12	17.5
Kristar	DVS-36	0.9
	DVS-48	1.6
	DVS-60	2.4
	DVS-72	3.5
	DVS-96	6.2